



Soil Organic Carbon: Mineralization and its Effect on Soil Health

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Presently, soil organic carbon content in India has come to 0.3% from 1% in past 70 year. Intensive cultivation of crop without providing proper compost/farm wastes to the soil is the reason behind the fall in soil organic carbon content, which creates imbalance in soil fertility, unfavorable soil physical condition and poor in biological system. Thus, it's damaged the soil health. Hence, this can be overcome by use and managing soil organic carbon through optimizing management practices. Management of soil organic carbon from residues helps to maintain nutrients availability and agricultural sustainability.

Definition of Soil Organic Carbon

“Soil organic carbon is the sum of all biologically derived organic materials found in the soil or on soil surface irrespective of its source, living stage of decomposition but excluding the above ground portion of living plant.”

Source of Soil Organic Carbon and its Management

1. Plant or crop residue.
2. Animal residue or waste.

Management:

- a. Mulching.
- b. Completely or partially incorporation of crop residue.
- c. Biochar production.
- d. Compost.
- e. No- tillage or conservative tillage practices.
- f. Pusa- decomposer capsule.
- g. Cover crop.
- h. Green manuring.



Decomposition

Decomposition is biological breakdown and biochemical transformation of complex dead material into simple organic and inorganic molecules.

Process of decomposition: When crop residue or organic manure apply into the soil, microorganisms' attacks on organic matter because microorganisms need energy, food and nutrients for their cell synthesis, protein or protoplasm synthesis and other process. When microorganism attack on residue they release some enzymes and enzymes breakdown long carbon chain into simple organic and inorganic compound and this process is known as a catabolism. During this process inorganic elements release, like carbon where microorganism utilize inorganic carbon for their cell synthesis and nitrogen for their protein synthesis this process is known as an immobilization where inorganic is converted into organic. In certain conditions, when microorganism dies due to shortage of food source and they release inorganic elements and this process is known as mineralization where organic is converted into inorganic element and available to plant for their growth. During decomposition of organic matter organic acid produced, in which some soluble substance are leached through percolating water this process is known as leaching.

Conclusion

Mineralization of organic carbon present in the organic matter is a complex process which depends on various factors such as moisture, temperature, C:N ratio, lignin content etc along with cultural and field management practices. Higher addition of organic matter through different cropping system, green manuring, suitable size of the organic wastes, with or without enriched organic manures in sole or combined application goes under mineralization is responsible to give higher crop yield. Further adoption of above practices improves the physical, chemical and biological properties of soil and it ultimately maintain soil health.

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